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FINAL TASK SPECIFIC PLAN FOR THE QUARRY AREA OF CONCERN SCOPING SURVEY
NAS BRUNSWICK ME
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TETRA TECH EC INC

**DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC
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**FINAL
TASK-SPECIFIC PLAN FOR THE QUARRY AREA OF CONCERN
SCOPING SURVEY**

**FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE**

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Prepared for



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ACRONYMS AND ABBREVIATIONS

APP	Accident Prevention Plan
cm ²	square centimeter
Cs-137	Cesium-137
CTO	Contract Task Order
DFW	Definable Features of Work
dpm	disintegrations per minute
HRA	Historical Radiological Assessment
LLRW	low-level radioactive waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
microR/hr	microrentgens per hour
NaI	Sodium Iodide
NASB	Naval Air Station Brunswick
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NORM	Naturally Occurring Radioactive Material
Ra-226	Radium-226
RASO	Radiological Affairs Support Office
ROC	radionuclides of concern
RSOR	Radiation Safety Officer Representative
RWP	Radiation Work Permit
SOP	Standard Operating Procedure
Sr-90	Strontium-90
SSHP	Site Safety and Health Plan
SU	Survey Unit
TtEC	Tetra Tech EC, Inc.
TSP	Task-Specific Plan
U-238	Uranium-238

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1.0 INTRODUCTION

Tetra Tech EC, Inc. (TtEC) has prepared this Task-Specific Plan (TSP) for the Quarry Area of Concern Scoping Survey located at the former Naval Air Station Brunswick (NASB), Brunswick, Maine for the United States Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic under a Removal Action Contract, N62470-13-D-8007, Contract Task Order (CTO) WE09. The survey will be conducted in accordance with the general approach and methodologies provided in the Basewide Radiological Management Plan (TtEC, 2014a) and Standard Operating Procedures (SOPs) provided in Attachment 3 to the Basewide Radiological Management Plan. The surveys will conform to the requirements of the Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP) (TtEC, 2013) and the Radiation Protection Plan, Attachment 2 to the Basewide Radiological Management Plan, prepared for the survey program.

The purpose of this scoping survey is to determine the extent of debris and gather radiological data at the Quarry Area of Concern to determine if there is a radiological concern at this site. The scoping survey will be performed concurrently with another subcontractor performing munitions of concern clearance activities at the site.

1.1 Site Description and Historical Summary

The Quarry Area of Concern is located southwest of the runways at the western boundary of NASB, adjacent to Maine State Route 123. There are no structures located in the Quarry Area of Concern. The approximately four acre area was used as a rock quarry in the 1940s and 1950s. Geophysical surveys found numerous subsurface anomalies indicating that dumping/disposal activities may have taken place in the area. A 1999 survey states that a quarry on the southwest side of the area was used by the Navy as a dump site. The location of the Quarry Area of Concern within NASB is shown on Figure A-1.

Site investigations have discovered significant amounts of debris at the site, including munitions. Debris observed included partially buried scrap metal, tires, and concrete. The majority of the observed debris has been found along the rock face at the eastern end of the Quarry. Munitions and explosives of concern include flares, fuses, a 0.50 caliber M2 Ball, a 2.75-inch shipping case and rocket venture tail assembly, a 2.75-inch diameter rocket motor case and tail assembly, and a MK31. Part of this site was also used for permitted petroleum sludge spreading/treatment in accordance with State of Maine requirements.

Because the type and years of use of the potential dumpsite are unknown, there is a possibility that radiologically contaminated debris, radioluminescent devices, and electronics containing radioisotopes could have been disposed at this site. Additionally, there were procedures in place as early as 1942 for radioluminescent items to be buried in remote areas. As such, the quarry is considered a potential for radiological impact (NAVSEA, 2014). Per the Historical Radiological Assessment (HRA), the radionuclides of concern (ROCs) are Cesium-137 (Cs-137), Radium-226 (Ra-226), Strontium-90 (Sr-90), and Uranium-238 (U-238).

2.0 SURVEY DESCRIPTION

During the implementation of this scoping survey, test pits will be excavated and munitions of concern clearance activities will be performed by USA Environmental, Inc. and chemical investigation activities will be performed by Tetra Tech, Inc. However, prior to the start of any intrusive work at the site, the accessible surfaces of the approximate 4 acre area will undergo a 100 percent health and safety gamma walkover survey in accordance with SOP 001, Radiation and Contamination Surveys using a Ludlum Model 19 (or equivalent) survey meter to ensure no areas exceeding 50 microR/hr exist. If any area exceeds 50 microR/hr, the area will be posted as a Radiologically Controlled Area, the Navy will be notified, survey activities will cease, and the Quarry Area of Concern will be re-classified as a Class 1 area. A separate TSP addressing remediation of radioactively contaminated soil and items with Class 1 surveys will be developed and approved by the Radiological Affairs Support Office (RASO) prior to recommencing radiological survey, munitions of concern clearance, and chemical investigation activities. Any areas with more elevated readings will be posted in accordance with SOP 012, Radiologically Controlled Areas and Posting Control.

Upon completion of the health and safety survey confirming that no areas exceed 50 microR/hr, surface vegetation removal and clearing of the entire Quarry Area of Concern will be performed by USA Environmental, Inc. to investigate potential anomaly targets of interest. Surface vegetation removal and clearing will be performed in a manner that does not disturb the ground surface. After USA Environmental, Inc. has cleared the surface of any munitions of concern and prior to USA Environmental, Inc. performing the excavation at each test pit location, the entire Quarry Area of Concern will be surveyed using a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch sodium iodide (NaI) detector (or equivalent) to identify areas in which discrete radioactive materials or radioactively contaminated materials may be located. The investigation level will be the mean plus 3 sigma (σ) where σ is the standard deviation of the gamma readings at each location. However, as a starting point, areas will be marked (e.g., with flags) based on the mean of the reference area plus 3σ value. After a one hundred percent gamma scan of the area has been completed, the mean of the survey unit plus 3σ investigation value will be determined. Marked areas will be reassessed based on this value. Any areas exceeding the investigation level will be further investigated through collection of a gamma static survey with a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent). If the static reading exceeds the investigation level, the onsite Radiation Safety Officer Representative will determine, based on professional judgment, whether further investigation is warranted. If site conditions (i.e., presence of material containing elevated concentrations of Naturally Occurring Radioactive Material [NORM]) are ruled out as the likely source of the elevated gamma readings, the location will be excavated by hand to a maximum depth of one foot to determine whether a discrete item or significant radiological contamination in a concentrated area may be the cause of the comparatively elevated gamma reading. If a discrete item and/or soils that exhibit elevated gamma readings are present, the items and a minimum of 1 foot of soil on either side and below the discrete items and/or soils that exhibit elevated gamma readings will be removed as described in a specific Radiation Work Permit. The discrete item and/or soils that exhibit elevated gamma readings will be placed in an appropriate low-level radioactive waste (LLRW) container for

subsequent transfer to the Navy's LLRW disposal contractor. Post-remediation soil samples will be collected from the excavation sidewalls and bottom and the removed soil if a discrete item is discovered. The excavated soil will be placed on plastic, spread out in a maximum 12-inch lift, resurveyed, and a biased soil sample will be collected from the area with the most elevated gamma readings. Any items removed from the soil will be surveyed in accordance with SOP 003, Release of Materials and Equipment from Radiologically Controlled Areas and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier. If no discrete item is located in an area exceeding the investigation level, a soil sample will be collected from the area with the most elevated gamma readings. The excavated ground surface will be resurveyed to confirm the remaining soil meets the investigation level. Survey area preparation activities will be performed under radiological controls established in the SOPs provided in the Basewide Radiological Management Plan (TtEC, 2014a).

The information gathered from these test pits will not only be used to investigate targets of interest but also will be used to further delineate the extent of debris and chemical contamination at the site. In addition, a subset of these test pits will be radiologically evaluated to determine if there is a radiological concern at the site. The approximate locations of the test pits that will be radiologically evaluated can be seen on Figure A-2 in Appendix A. The actual locations and number of test pits presented in Appendix A may be modified based on the target locations specified in USA Environmental, Inc.'s Navy-approved Work Plan. USA Environmental, Inc. will mark the actual locations in the field. TtEC will radiologically evaluate 29 locations or total number as agreed upon in consultation with the Navy and appropriate regulatory agencies. During the test pitting activities, photographs will be collected documenting the contents of the waste material encountered in each test pit along with field notes describing the waste materials. Global Positioning Information System data for each location will be provided by USA Environmental, Inc. The results of the radiological evaluations will be used in the development of a Remedial Investigation and Feasibility Report. The results of the investigation will provide sufficient data to allow development of a subsequent Remedial Action Work Plan/TSP to allow for on-site consolidation of the waste material into a restricted release area with the areas that the materials were removed to be radiologically free released during Phase 2.

The radiological evaluation locations will be excavated by USA Environmental, Inc. to depths presented in USA Environmental's Navy-approved Work Plan and until the vertical extent of debris has been determined. Geophysical surveys of the site will be performed by USA Environmental, Inc. prior to excavating test pits. All excavations will be completed in 12-inch lifts. After the initial surface scan and removal of the first 12-inch lift of soil by USA Environmental, Inc., and after USA Environmental, Inc. has cleared the exposed surface of any munitions of concern, the exposed ground surface will be surveyed using a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent) to identify areas in which discrete radioactive materials or radioactively contaminated materials may be located. Soil will be surveyed until the groundwater level is reached. The depth at which groundwater is reached will be annotated in the radiological survey documentation. The investigation level will be the mean plus 3σ where σ is the standard

deviation of the gamma readings of the surface area of the Quarry Area of Concern. However, as a starting point, areas will be marked based on the mean of the reference area plus 3σ value.

After a one hundred percent gamma scan of the area has been completed, the mean of the Quarry Area of Concern surface area plus 3σ investigation value will be determined. Marked areas will be reassessed based on this value. Any areas exceeding the investigation level will be further investigated through collection of a gamma static survey with a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent). If the static reading exceeds the investigation level, the location will be excavated by hand to a maximum depth of one foot to determine whether a discrete item and/or soils that exhibit elevated gamma readings may be the cause of the comparatively elevated gamma reading. If a discrete item or items are present and/or soils that exhibit elevated gamma readings, the items and/or soils that exhibit elevated gamma readings and a minimum of one foot of soil on either side and below the discrete items and/or soils that exhibit elevated gamma readings will be removed as described in a specific Radiation Work Permit. The discrete item and/or soils that exhibit elevated gamma readings will be placed in an appropriate LLRW container for subsequent transfer to the Navy's LLRW disposal contractor.

Post-remediation soil samples will be collected from the excavation sidewalls and bottom and from the removed soil if a discrete item and/or soils that exhibit elevated gamma readings is discovered. The excavated soil will be placed on plastic, spread out in a 12-inch lift, resurveyed and a biased soil sample will be collected from the area with the most elevated gamma readings. Any items removed from the soil will be surveyed in accordance with SOP 003, Release of Materials and Equipment from Radiologically Controlled Areas and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier. If no discrete item and/or soils that exhibit elevated gamma readings are located in an area exceeding the investigation level, a soil sample will be collected from the area with the most elevated gamma readings. The excavated ground surface will be resurveyed to confirm the remaining soil meets the investigation level. Surface scans and soil removal activities will be completed in 12-inch lifts as described above until the excavation depths specified in USA Environmental, Inc.'s Navy-approved Work Plan and the vertical extent of the debris has been determined. Radiologically and geophysically scanned soil will be stockpiled next to the excavations.

Note that encountering radiologically contaminated soil is not expected; however, if radiologically contaminated soil is detected based on gamma survey readings and the discovery of discrete radioactive material and/or soils that exhibit elevated gamma readings, the soil one foot around the discrete radioactive material in all directions will be removed as described in a specific Radiation Work Permit. The discrete item will be placed in an appropriate LLRW container for subsequent transfer to the Navy's LLRW disposal contractor. Post-remediation soil samples will be collected from the excavation sidewalls and bottom and of the removed soil if a discrete item and/or soils that exhibit elevated gamma readings is discovered. The excavated soil will be placed on plastic, spread out in a 12-inch lift resurveyed and a soil sample will be collected from the area with the most elevated gamma readings. Any items removed from the soil will be surveyed in accordance with SOP 003, Release of Materials and Equipment from

Radiologically Controlled Areas and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier. If no discrete item and/or soils that exhibit elevated gamma readings are located in an area exceeding the investigation level, a biased soil sample will be collected from the area with the most elevated gamma readings. The excavated ground surface will be resurveyed to confirm the remaining soil meets the investigation level.

At each radiological evaluation location, soil samples will be collected from the sidewalls (4 each) and excavation bottom (2 each). Sample locations will be biased based on the most elevated gamma scan readings and the professional judgment of the Radiation Safety Officer Representative (RSOR) or designee to provide conservative at depth data. A four point composite soil sample will be collected of the stockpiled soil. One hundred percent of all of the soil samples will be analyzed for Cs-137, Ra-226, Isotopic Uranium for U-238 and Total Strontium for Sr-90. Sample results will be compared to the investigation criteria specified in Table 2-1. All samples will be analyzed by a Department of Defense Environmental Laboratory Accreditation Program approved laboratory. Following completion of the investigation activities at each location, each test pit location will be backfilled with the removed radiologically screened soil in accordance with USA Environmental, Inc.'s Navy-approved Work Plan. Each location will be flagged/marked in the field.

Once a test pit location has been cleared of munitions and radiologically screened, Tetra Tech Inc. may also collect soil samples or soil borings for chemical analysis in accordance with their Navy-approved Work Plan. All soil samples and soil borings will be placed on plastic and radiologically screened with a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent) to identify areas in which discrete radioactive materials or radioactively contaminated materials may be located. Discrete soil samples collected for volatile organic compound analysis will be screened in place when possible, or after the sample is collected.

All debris encountered during the excavation activities will be removed and surveyed as materials and equipment per SOP 003, Release of Materials and Equipment from Radiologically Controlled Areas and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier. Materials with contamination present above the levels specified in Table 2-1 will be packaged for subsequent decontamination or storage and disposal as LLRW. Materials containing asbestos will be removed by a certified asbestos abatement contractor and packaged for disposal based on the results of the radiological survey and soil sample analytical data collected from that location in consultation with RASO. Materials that cannot be surveyed (e.g., mangled debris with surfaces that cannot be surveyed), will also be considered potentially radioactive and will be packaged for storage and subsequent disposal as LLRW unless determined by the RSOR based on exterior surveys, and knowledge of the original function of the object in consultation with RASO. Materials meeting the investigation criteria will be stockpiled on site until can be placed in the on-site waste consolidation area to be constructed during Phase 2 of this project. Scrap metal will be recycled off-site to the maximum extent practicable. Any decontamination water generated during Tetra Tech Inc.'s investigation activities will be managed in accordance with

the Waste Management Plan (TtEC, 2014b). Note the drums/tanks to contain the decontamination water will be provided by Tetra Tech Inc. No dewatering of the excavations will be performed during this phase of the project. Per USA Environmental, Inc. and Tetra Tech Inc., dewatering is not required in performing the munitions clearance and chemical investigation activities.

Locations of test pits for munition clearance purposes are based on professional judgment with the intent of exposing potentially buried munitions. Hence, the test pits will be performed in locations where disposal activities would have taken place. If radiologically contaminated items were disposed of at this site they would likely be collocated with other disposed waste. Therefore, by performing radiological evaluations at the test pit locations, this scoping survey has been conservatively designed to evaluate potential radiological impacts. In the event that no soil samples or debris encountered exceed the investigation criteria, the soil sample results will be equivalent to a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Class 3 Survey Unit and its results will be used to draft a Final Status Survey report.

2.1 Investigation Criteria

The investigation criteria for soil and materials and equipment (total surface activity and removable contamination) for the specific ROCs are provided in Table 2-1.

2.2 Reference Area

Prior to performing the survey activities, a background reference area will be established for the Quarry Area of Concern survey activities. A non-radiologically impacted soil background reference area with similar physical, chemical, geological, radiological, and biological characteristics as the Quarry Area soil will be selected. For debris that is encountered, material-specific background will be established. Reference areas will be chosen by the RSOR, in consultation with the Navy and appropriate regulatory agencies. A minimum of twenty samples will be collected and analyzed for all of the ROCs by a Department of Defense Environmental Laboratory Accreditation Program approved laboratory.

2.3 Investigation Level

For gamma surveys, the investigation level will be established at the Quarry Area mean plus 3σ , where σ is the standard deviation of the gamma readings in the Quarry Area of Concern. Areas where the investigation levels are exceeded will be subjected to additional scrutiny at the discretion of the RSOR or designee, and in consultation with RASO.

2.4 Gamma Scans

The surface areas of each test pit location, until groundwater depth has been reached, will be scanned with a RASO-approved drive-over array system or using a Ludlum Model 2350-1 survey meter coupled to a Ludlum 44-10 2-inch by 2-inch NaI detector at a speed not to exceed 0.5 meters/sec and will be operated in accordance with the Basewide Radiological Management Plan (TtEC, 2014a). Gamma scans of the surface areas of the site will be logged and submitted with the final report. In addition, gamma scans of each 12-inch lift within each excavation will

be performed using a Ludlum Model 2350-1 survey meter coupled to a Ludlum 44-10 2-inch by 2-inch NaI detector and will be operated in accordance with the Basewide Radiological Management Plan (TtEC, 2014a).

2.5 Exposure/Dose Rate Measurements

Prior to conducting test pit and munitions clearance activities, a general area gamma exposure/dose rate survey will be conducted in accordance with SOP 001, Radiation and Contamination Surveys for safety and radiological posting purposes, as well as to identify any areas with comparatively elevated gamma exposure rates. If any area exceeds 50 microR/hr, the area will be posted as a Radiologically Controlled Area, the Navy will be notified, survey activities will cease, and the Quarry Area of Concern will be re-classified as a Class 1 area. A separate TSP addressing remediation of radioactively contaminated soil and items with Class 1 surveys will be developed and approved by RASO prior to recommencing radiological survey, munitions of concern clearance, and chemical investigation activities. Ludlum Model 19, Bicon MicroRem, or equivalent, radiation detection instruments will be used to perform the measurements. The measurements will be conducted with the instrument at approximately 1 meter from the ground surface.

2.6 Media Samples

Soil samples collected from the excavation sidewalls and bottom and of the removed soil as described in Section 2.0, Survey Description, will be analyzed for Cs-137, Ra-226, Total Strontium for Sr-90, and Isotopic Uranium for U-238. All samples will be collected and analyzed in accordance with the Sampling and Analysis Plan (TtEC, 2014c). Any discrete items removed during excavation that appear to be radioactive upon survey with a Ludlum 2350-1 survey meter coupled to a Ludlum 44-10 2-inch by 2-inch NaI detector will be surveyed in accordance with SOP 003, Release of Materials and Equipment and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier.

Water samples of the decontamination water will be collected and analyzed for Cs-137, Ra-226, Total Strontium for Sr-90, and Isotopic Uranium for U-238. All water samples will be collected and analyzed in accordance with the Sampling and Analysis Plan (TtEC, 2014c). If the analytical data indicates exceedances of the investigation criteria in Table 2-1, the decontamination water will be turned over to the Navy's LLRW disposal contractor; otherwise, the decontamination water will be turned back over to Tetra Tech Inc. for chemical analysis and final disposition.

2.7 Dose Modeling in Support of Demonstrating Indistinguishability from Background

In the event that no investigation criteria exceedances are observed during the performance of the survey and sampling activities detailed in this TSP, a MARSSIM Class 3 Final Status Survey Report will document the Quarry Area of Concern as radiologically free released. If any investigation criteria exceedances are noted for ROCs, the radiological data will be assessed to determine whether the concentrations for the ROCs are indistinguishable from background. This

may be accomplished for soil by demonstrating that the survey unit soil ROC sample concentrations are indistinguishable from the corresponding reference area ROC concentrations through statistical analysis using scenario B from NUREG-1505 (NRC 1998). In addition, dose and risk modeling of the Quarry Area of Concern using the soil analytical results will be performed and documented in the final report. If investigation criteria are exceeded for any soil samples, and indistinguishability from background cannot be established through statistical analysis or radioactive materials removed, additional remedial actions and surveys may be conducted in accordance with a subsequent TSP, after review of the results of this scoping survey.

3.0 QUALITY CONTROL

The data quality objectives for the survey and sampling activities are provided in Table 3-1.

Definable features of work (DFWs) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFW for this task is radiological surveys. Description of this DFW and the associated phases of quality control are presented in Table 3-2.

4.0 ENVIRONMENTAL PROTECTION

The environmental protection-driven requirements have been addressed in the Environmental Protection Plan (TtEC, 2014d). No additional requirements are necessary.

5.0 REFERENCES

- DoD (Department of Defense), Department of Energy, Nuclear Regulatory Commission, and U.S. Environmental Protection Agency. 2000. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Revision 1. August.
- NAVSEA (Naval Sea Systems Command.). 2014. Final Historical Radiological Assessment, History of the Use of General Radioactive Materials 1943 to 2011. March.
- NRC (Nuclear Regulatory Commission). 1998. A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys, NUREG-1505, Revision 1. June.
- TtEC (Tetra Tech EC, Inc.). 2014a. Basewide Radiological Management Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014b. Waste Management Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014c. Sampling and Analysis Plan, Former, Radiological Remediation/Assessment, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014d. Environmental Protection Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2013. Accident Prevention Plan/Site Safety and Health Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

TABLES

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**TABLE 2-1
 QUARRY AREA OF CONCERN
 PRIMARY RADIATION PROPERTIES AND INVESTIGATION CRITERIA
 FOR RADIONUCLIDES OF CONCERN**

Radionuclide	Primary Radiation Properties		Investigation Criteria			
	Half-life	Type	Materials, Equipment, and Wastes		Soil Samples (pCi/g) ^a	Water Samples (pCi/L) ^c
			Total Surface Activity (dpm/100 cm ²)	Removable Activity (dpm/100 cm ²)		
Cs-137	3.01E01 years	Beta	5,000	1,000	6.6	119
Ra-226	1.6E03 years	Alpha	100	20	1.0	5 ^d
Sr-90	2.86E01 years	Beta	1,000	200	1.02 ^b	8
U-238	4.47E09 years	Alpha/Beta	5,000	1,000	8.4	30

Notes:

- ^a Criteria is above background for those radionuclides found in background soils.
- ^b Total Strontium analysis is the analytical method used to conservatively quantify Sr-90 concentration.
- ^c Investigation criteria for water have been derived from *Radionuclides Notice of Data Availability Technical Document* (EPA 2000) Table III, which compared the federal drinking water standards from the 1976 and 1991 Maximum Contaminant Levels. This value reflects the most conservative limit.
- ^d Limit is for total Radium Concentration.

Abbreviations and Acronyms:

Cs-137 – Cesium-137	pCi/L picocuries per liter
cm ² - square centimeters	Ra-226 – Radium-226
dpm - disintegration per minute	Sr-90 – Strontium-90
pCi/g picocurie per gram	U-238 – Uranium-238

**TABLE 3-1
 SUMMARY OF DATA QUALITY OBJECTIVES**

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	Identify the Goal of the Study	Identify Information Inputs	Define the Boundaries of the Study	Develop the Analytical Approach	Specify Performance or Acceptance Criteria	Develop the Plan for Obtaining Data
The Quarry Area of Concern is designated as an HRA site. The radionuclides of concern (ROCs) are Cs-137, Ra-226, Sr-90, and U-238. It must be determined if the activity concentrations of the ROCs and surface activities for excavated materials are less than the site-specific investigation criteria for these radionuclides or if remediation is warranted.	The primary use of the data expected to result from completion of this TSP is to support radiological scoping of the site. Therefore, the decision to be made can be stated as “Do the results of the survey meet the investigation criteria?”	Radiological surveys required to support the Scoping Survey of the site will include: <ul style="list-style-type: none"> • Gamma scan surveys of the accessible areas and each lift of the test pit and target of interest locations using a RASO-approved drive-over array mechanism and/or hand-held instrumentation on soil (ground) surfaces • Four sidewall and two excavation bottom soil samples per test pit • One four-point composite soil sample per soil stockpile • Surveys for fixed and removable contamination on excavated materials 	The lateral and vertical spatial boundaries for this survey effort are confined to the site as shown on the figures in Appendix A.	The results of the survey will be used to radiologically characterize the site.	Limits on decision errors are set at 5 percent as specified in the Basewide Radiological Management Plan (TtEC, 2014a).	Operation details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM (DoD et al. 2000). Specific assumptions regarding types of radiation measurements, instrument detection capabilities, quantities and locations of data to be collected, and investigation levels are contained in this TSP and the Basewide Radiological Management Plan (TtEC, 2014a).

Abbreviations and Acronyms:

Cs-137 – Cesium-137
 HRA – Historical Radiological Assessment
 MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual
 Ra-226 – Radium-226
 Sr-90 – Strontium-90
 TSP – Task-specific Plan

U-238 – Uranium-238

TABLE 3-2
DEFINABLE FEATURES OF WORK FOR RADIOLOGICAL SURVEYS

ACTIVITY	PREPARATORY (Prior to initiating survey activity)	DONE	INITIAL (At outset of survey activity)	DONE	FOLLOW-UP (Ongoing during survey activity)	DONE
Radiological surveys and sampling	<ul style="list-style-type: none"> • Verify that an approved TSP is in place. • Verify that the Remedial Project Manager, Navy Technical Representative, and the Caretaker Site Office are notified about mobilization. • Verify that an approved RWP, if required, is available and has been read and signed by assigned personnel. • Verify that the Basewide Radiological Management Plan (TtEC, 2014a), APP/SSHP (TtEC, 2013), and TSP have been reviewed. • Verify that personnel assigned are trained and qualified. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimetry have completed NRC Form 4. • Verify that relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used. • Verify that equipment is on site and in working order (initial daily check). 		<ul style="list-style-type: none"> • Verify that radiological instruments are as specified in the Basewide Radiological Management Plan (TtEC, 2014a) and TSP. • Inspect Training Records. • Verify that a qualified RCT and SSHO are present in the active work areas. • Verify that reference area measurements have been obtained in accordance with the Basewide Radiological Management Plan (TtEC, 2014a) and this TSP. The same survey methodology and instruments used to collect the background data will be used to perform measurements within survey units. • Verify that daily checks were performed on all survey instruments. • Verify that instrument calibration and setup are current. • Verify that required dosimetry is being worn. • Verify that field logbooks, chain-of-custody documents, and proper forms are in use. • Verify that samples and measurements are being collected in accordance with the TSP, Basewide Radiological Management Plan (TtEC, 2014a), and applicable SOPs. • Verify the sample handling is in accordance with the Basewide Radiological Management Plan (TtEC, 2014a) and applicable SOPs. 		<ul style="list-style-type: none"> • Verify that the site is properly posted and secured, if necessary. • Conduct ongoing inspections of material and equipment. • Verify that a qualified RCT and SSHO are present at active work areas. • Verify that daily instrument checks were obtained and documented. • Verify the survey results were documented. • Verify that personnel have read and signed the revised RWP, if revision is required. • Inspect chain-of-custody and survey logs for completeness. • Verify the survey activities conform to the TSP. • Verify that survey instruments are recalibrated after repairs or modifications. • Verify that site activities are being photographed. • Verify that survey documentation is reviewed by the RSOR. 	

Task-Specific Plan for the Quarry Area of Concern Scoping Survey
Contract No. N62470-13-D-8007
Contract Task Order No. WE09

Final
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Abbreviations and Acronyms:

APP – Accident Prevention Plan

NRC – Nuclear Regulatory Commission

RCT – Radiation Control Technician

RSOR – Radiation Safety Officer Representative

RWP – Radiation Work Permit

SOP – Standard Operating Procedure

SSHO – Site Safety and Health Officer

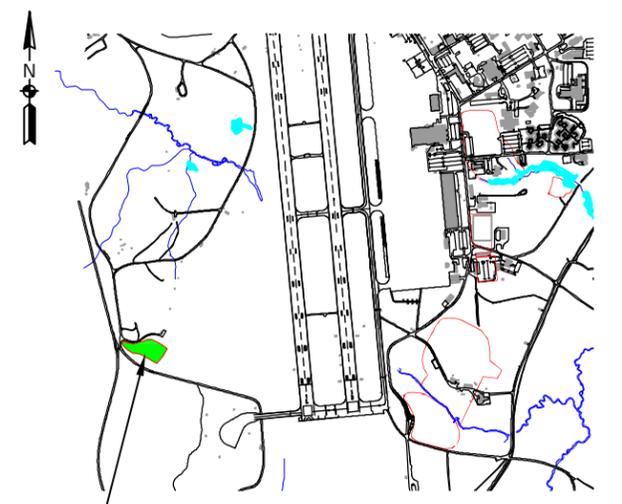
SSHP – Site Safety and Health Plan

TSP – Task-Specific Plan

APPENDIX A

FIGURES FOR QUARRY AREA OF CONCERN SURVEYS

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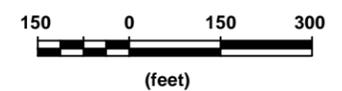


KEYPLAN

QUARRY AREA OF CONCERN

LEGEND

— QUARRY BOUNDARY



TASK-SPECIFIC PLAN FOR QUARRY AREA OF CONCERN
CHARACTERIZATION SURVEY

FIGURE A-1

QUARRY AREA OF CONCERN PLAN VIEW
FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

REVISION: —
AUTHOR: A.CRABTREE
PROJECT NO:
FILE: SEE BELOW





NOTE:

1. PROPOSED TEST PIT AND TARGET OF INTEREST LOCATIONS BASED ON PRIOR GEOPHYSICAL SURVEY DATA AND DEBRIS AND MUNITIONS OF CONCERN FINDS TO DATE. ACTUAL LOCATIONS TO BE COORDINATED WITH USA ENVIRONMENTAL, INC. AND TETRA TECH NUS.

LEGEND

- QUARRY BOUNDARY
- FENCE LINE
- NON-MEC RELATED DEBRIS (SURFACE)
- NON-MEC RELATED DEBRIS (SUBSURFACE)
- MEC/MPPEH (SUBSURFACE)
- ANOMALIES IDENTIFIED DURING MEC SITE INVESTIGATION GEOPHYSICAL SURVEY
- MEC MUNITIONS OF CONCERN
- MPPEH MATERIAL POTENTIALLY PRESENTING AN EXPLOSIVES HAZARD



TASK-SPECIFIC PLAN FOR QUARRY AREA OF CONCERN
CHARACTERIZATION SURVEY

FIGURE A-2

TEST PIT AND TARGET OF INTEREST LOCATIONS
FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

REVISION: — AUTHOR: A.CRABTREE PROJECT NO: FILE: SEE BELOW	
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